GREENSPACE TRENDS REPORT

2007-2011

Google Images, WonderLab Garden, Bloomington, IN 2014.

BLOOMINGTON, INDIANA

July 25, 2014

CITY OF BLOOMINGTON
ENVIRONMENTAL COMMISSION

GREENSPACE TRENDS IN BLOOMINGTON, INDIANA
2007 – 2011
City of Bloomington Environmental Commission

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Introduction

A "haven of blooms, the gateway to scenic southern Indiana, Tree City USA" –all designations for Bloomington, Indiana. As we steadily develop from a quaint town into a thriving urban municipality, it is important to remember what makes Bloomington so distinctly attractive to newcomers and natives alike. Bloomington protects its assets by conducting a periodic assessment of greenspace gain or loss. The City of Bloomington Environmental Commission (EC) began this assessment in 1993 and this report is an update of that assessment. With the assistance of the City's Information and Technology Services (ITS), Planning Department, and Indiana University (IU), the "Greenspace Trends Report 2007-2011" covers the change in greenspace from the 2007 records.

The tables in this report demonstrate the findings from analyzing 2007-2011 data on acres of greenspace. The data are categorized into different sections: with and without areas intended for annexation (AIFA), greenspace trends from 1993-2011, tables illustrating percent loss and gain comparing past and current years, and graphs illustrating percent loss and gain comparing past and current years.

Some common definitions of greenspace include the following. An area of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in an otherwise urban environment (Oxford Dictionaries, 2014), and greenspace is any open piece of land that is undeveloped and is accessible to the public (United States Environmental Protection Agency, 2014). The EC defined the term "greenspace" a bit differently. In the past report "Towards a Comprehensive Greenspace Plan for the City of Bloomington 2003," the basics of greenspace are defined and summarized to address three characteristics:

1. **The area must possess a permeable surface.** This includes forested, shrubbery and grassy areas, parks, golf courses, cemeteries, and agricultural areas.
2. **The area must be greater than one contiguous acre.**
3. **The area must be more than ten feet from any manmade development, such as roads, parking lots, and buildings.** This generally excludes most lawns, roadside plantings, and small tree-covered plots, including parks, golf courses and some common open spaces.

In 2003, the report "Greenspace Trends in Bloomington, Indiana 1993-2003" covered a crucial ten-year span providing ample information of change in the city's greenspace. Subsequently, the report "Greenspace Trends in Bloomington, Indiana 1993-2007" continued its greenspace survey and analysis of the data. These reports can serve as a reference to the way past reports were conducted as well as for comparison to this report.

Findings

Findings with AIFA Information

The city's greenspace is divided into these categories: total greenspace, IU greenspace, park greenspace, and non-IU/non-park (referring to other greenspace generally privately owned). From 2007 to 2011 there have been fluctuations in greenspace loss and gain. The percentage in:

- IU greenspace loss from 2007-2011 was 0.4% bringing the acreage to 1,216.64 acres;
- Park greenspace gain from 2007-2011 was 6.2% bringing the acreage to 1,461.47 acres;
- Non-IU/Non-Park loss from 2007-2011 was 1.9% bringing the acreage to 3,760.08 acres;
- The overall percentage loss in greenspace from 2007-2011 was -0.1%. This means the city gained more greenspace than it lost, which brings the overall acreage to 6,438.19 acres, gaining 8.86 acres more than the 2007 overall acreage.

As such, this report marks the first time since 1993 that total greenspace within the city increased rather than following the previous trends of decreasing. The new acreage obtained by the Parks and Recreation Department in 2011 was 85.34 acres, and IU and non-IU/non-park loss of greenspace was 76.48 acres. Thus Parks and Recreation aided the city with its gain in greenspace by adding 8.86 acres to the total.

In 1993 the EC completed its first greenspace report. Since then, the loss or increase of greenspace has been recorded for the following years 1993, 1998, 2002, 2003, 2005, 2006, 2007, and 2011. The year 2011

provided the most up to date aerial photos available. To be consistent with the reports from 1993-2011, the totals in this section of the document includes the AIFA. Since 1993, the overall trend in the four categories of greenspace declined with the exception of park greenspace (see Figure 1 on next page).

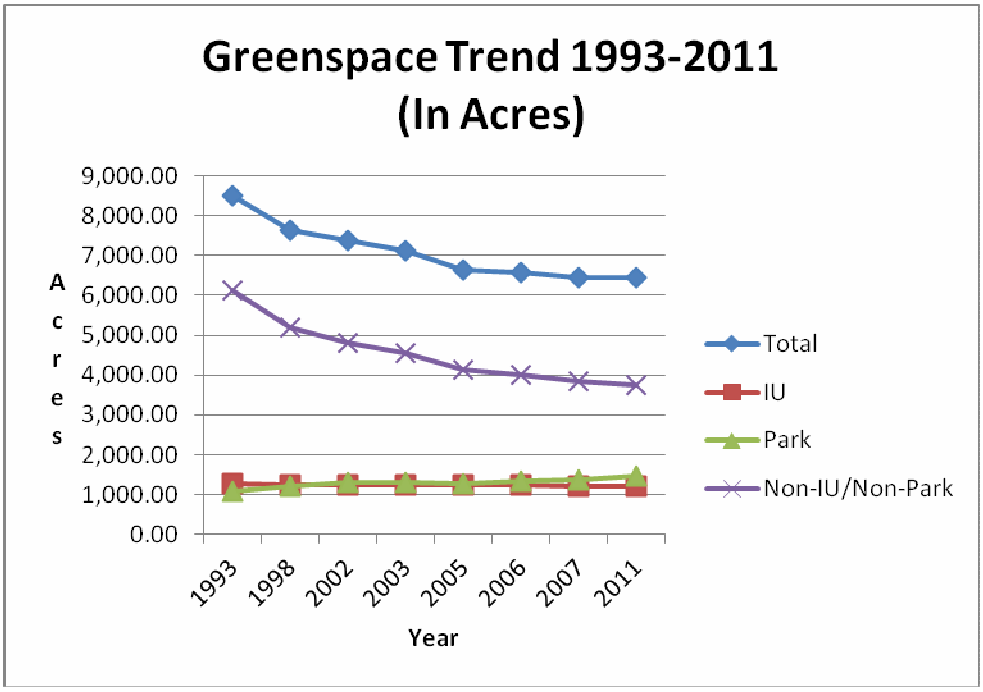


Figure 1. Greenspace trend graph in Bloomington including AIFA, 1993-2011.

The gain of 8.86 acres is seen on the graph where the Park category slightly increases from 2007-2011. The Total category also demonstrates a change from the previous trend by leveling out instead of decreasing. The observed reversal of the trend of decreasing greenspace in 2011 could serve as a turning point for preserving and gaining greenspace for the city.

Currently, each individual category of greenspace is no longer drastically decreasing. Furthermore, Total Greenspace loss of -0.1% is the first representation of gain in greenspace since 1993. This could be a result of enforcing Policy 2 in the *Nurture Environmental Integrity* section of Bloomington's 2002 *Growth Policies Plan* (GPP). Policy 2 covers the protection of trees and greenspace from development impacts. Additionally, non-IU/non-park greenspace is the smallest recorded decrease of 1.9%. Again, this could be the result from Policy 2 which gives suggestions on preserving trees and greenspace throughout the city. The Park category gained greenspace having the third highest percent increase in 2011 (6.2% from 2007) with the second highest increase in 2002 (8% from 1998) and the highest increase in 1998 (11.3% from 1993) (see Table 2 on page 6 and Figure 2 on page 7).

Findings without AIFA Information

This report contains two new elements. The first addition calculates the city's greenspace change from 2007-2011 excluding the areas intended for annexation (AIFA). The second addition illustrates the remaining greenspace in 2007-2011 without including the AIFA, while providing the same categories of greenspace (total greenspace, IU greenspace, park greenspace, and non-IU/non-park). (See Table 1 on next

page for acreage information). The previous reports included AIFAs because the assumption was that by the time the report became updated, the AIFA's would be within the municipal boundary.

In 2014, data from 2011 were added to the "Greenspace Trends Report." This report added greenspace change without including the AIFAs. This new style and the previously collected data which includes the AIFA, serves to represent greenspace change in two different ways. The new method of recording Bloomington's loss or increase of greenspace without the AIFA will help define greenspace within the city with greater accuracy, because it is not clear if all AIFA acreage will eventually be annexed. As a result, this new reporting style will set an example for future reports to cover the real city limits. The previous map with the AIFA was included in this report for the purpose of comparing past reports along with the maps generated with the new reporting style.

DATE	TYPE	AREA (in acres)
2011	Total	5,637.82
	IU	1,216.64
	Park	1,461.47
	Non-IU/Non-Park	2,959.71

Table 1. City of Bloomington greenspace categorized without AIFA, 2011.

Discussion

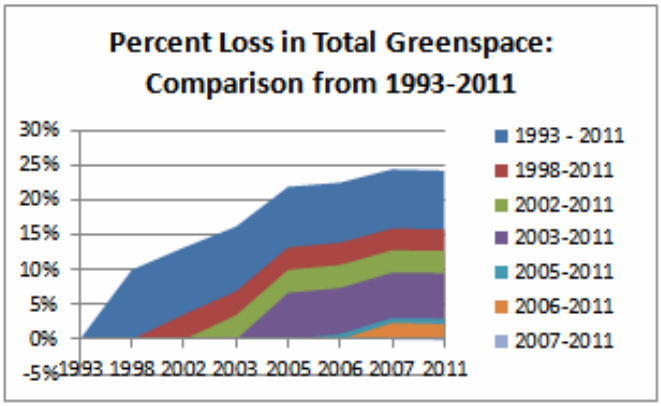
As seen in Figure 1 on page 4, the amount of greenspace is decreasing at a slower rate than in the past. This could be a result from Policy 2 intended for trees and greenspace where "If trees must be removed as part of any development, then developers shall be required to adhere to tree replacement standards" (Growth Policies Plan, page 9). Because of this philosophy and subsequent regulations, developers are becoming more aware of greenspace conservation and preservation.

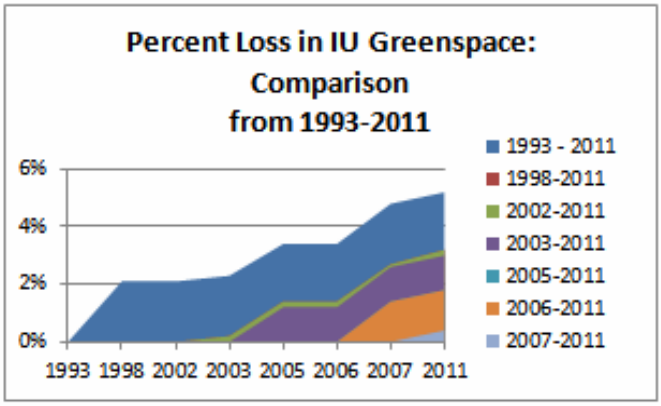
In Table 2 on page 6, the overall percent change from 2007-2011 in every category illustrates minimal reduction in greenspace. This might be connected to the awareness Americans express towards greenspace. According to "Threats to Green Infrastructure and Urban Ecosystem Services," found on the EPA website, urban sprawl globally becomes a threat to the maintenance of greenspace within cities. This document acknowledges that "Americans clearly recognize the problems rapid development presents…" and that people are now taking action.

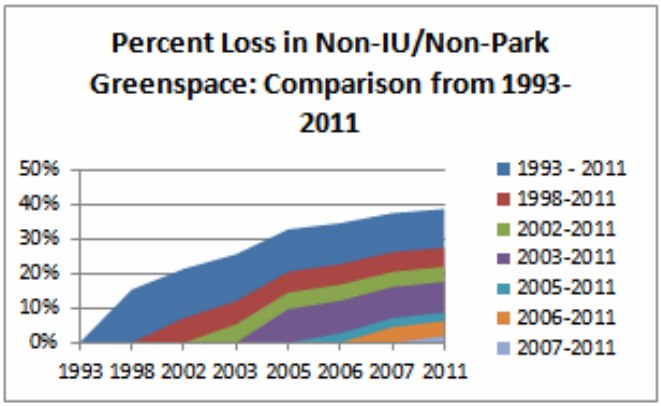
The City of Bloomington continues taking strides to acquire and preserve local greenspace. The graph representing Percent Gain in Park Greenspace (Figure 2 on page 7) verifies substantial increase in greenspace from 2007 to 2011. The same graph shows a continuous increase in park greenspace from 2005-2007. In the "Nurture Environmental Integrity" section of the 2002 *Growth Policies Plan*, the section clearly states "land preservation can be accomplished through a variety of means, whether it is through private conservation easements, dedications of land, or when appropriate, through the purchase of land" (Page 9). The city may continue to see an increase in greenspace with future enforcement of Policy 2 from the GPP.

	% Loss since 1993	% Loss since 1998	% Loss since 2002	% Loss since 2003	% Loss since 2005	% Loss since 2006	% Loss since 2007
Total							
1993	-	-	-	-	-	-	-
1998	10.0%	-	-	-	-	-	-
2002	13.2%	3.6%	-	-	-	-	-
2003	16.2%	6.9%	3.5%	-	-	-	-
2005	21.9%	13.2%	10.0%	6.7%	-	-	-
2006	22.5%	13.9%	10.7%	7.4%	0.8%	-	-
2007	24.4%	15.9%	12.8%	9.6%	3.1%	2.4%	-
2011	24.2%	15.8%	12.7%	9.5%	3.0%	2.2%	-0.1%
IU							
1993	-	-	-	-	-	-	-
1998	2.1%	-	-	-	-	-	-
2002	2.1%	0.0%	-	-	-	-	-
2003	2.3%	0.2%	0.2%	-	-	-	-
2005	3.4%	1.4%	1.4%	1.2%	-	-	-
2006	3.4%	1.4%	1.4%	1.2%	0.0%	-	-
2007	4.8%	2.7%	2.7%	2.6%	1.4%	1.4%	-
2011	5.2%	3.2%	3.2%	3.0%	1.8%	1.8%	0.4%
Non-IU/ Non-Park							
1993	-	-	-	-	-	-	-
1998	15.4%	-	-	-	-	-	-
2002	21.4%	7.1%	-	-	-	-	-
2003	25.6%	12.0%	5.3%	-	-	-	-
2005	32.8%	20.5%	14.5%	9.7%	-	-	-
2006	34.6%	22.7%	16.8%	12.1%	2.7%	-	-
2007	37.5%	26.2%	20.5%	16.1%	7.1%	4.5%	-
2011	38.7%	27.5%	22.0%	17.6%	8.8%	6.2%	1.9%
	% Increase since 1993	% Increase since 1998	% Increase since 2002	% Increase since 2003	% Increase since 2005	% Increase since 2006	% Increase since 2007
Park							
1993	-	-	-	-	-	-	-
1998	11.3%	-	-	-	-	-	-
2002	20.2%	8.0%	-	-	-	-	-
2003	20.2%	8.0%	0.0%	-	-	-	-
2005	18.2%	6.2%	-1.6%	-1.6%	-	-	-
2006	23.7%	11.2%	3.0%	3.0%	4.7%	-	-
2007	27.5%	14.6%	6.1%	6.1%	7.9%	3.0%	-
2011	35.4%	21.7%	12.7%	12.7%	14.6%	9.4%	6.2%

Table 2. Percentage Loss/Increase in greenspace categories from 1993-2011.







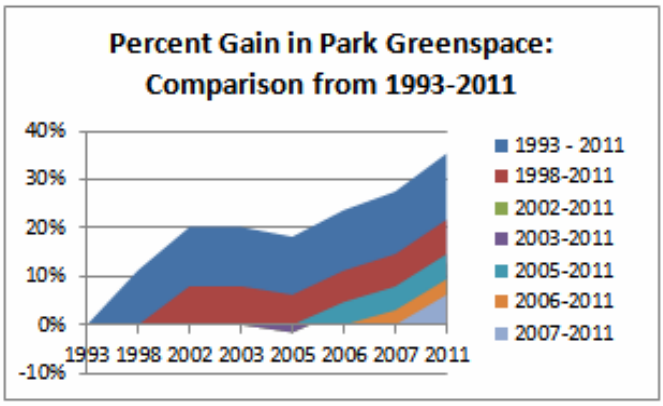


Figure 2. Percentage Loss/Gain in greenspace categories from 1993-2011; by graph.

Another stark representation of this trend can be shown through the data from 1993-2011. (See Table 3 below). Looking at the Total category in each type of greenspace, the area (in acres) decreases at a tremendous rate. The year 2011 is the only exception to this decreasing rate when the Total area in acres increased, breaking the trend from previous years.

DATE	TYPE	AREA (in acres)
1993	Total	8,494.65
	IU	1,283.48
	Park	1,079.30
	Non-IU/Non-Park	6,131.87
1998	Total	7,645.60
	IU	1,256.52
	Park	1,201.10
	Non-IU/Non-Park	5,187.98
2002	Total	7,373.81
	IU	1,256.52
	Park	1,296.80
	Non-IU/Non-Park	4,820.49
2003	Total	7,114.86
	IU	1,254.20
	Park	1,296.80
	Non-IU/Non-Park	4,563.86
2005	Total	6,637.52
	IU	1,239.20
	Park	1,275.57
	Non-IU/Non-Park	4,122.75
2006	Total	6,584.95
	IU	1,239.20
	Park	1,335.45
	Non-IU/Non-Park	4,010.30
2007	Total	6,429.33
	IU	1,222.03
	Park	1,376.13
	Non-IU/Non-Park	3,831.17
2011	Total	6,438.19
	IU	1,216.64
	Park	1,461.47
	Non-IU/Non-Park	3,760.08

Table 3. Area in acres categorized by type of greenspace, according to each year; 1993-2011.

As we address the future, some additional changes could further clarify specifics and suggestions about greenspace. The characteristics that define greenspace could possibly be expanded to include green infrastructure, such as green roofs, wall gardens, recreational paths, and other smaller areas. Another way to maintain and protect the city's greenspace can be to obtain additional funds that should be directed towards greenspace acquisition.

The 2003 *Growth Policies Plan* emphasizes this statement and encourages the importance of preserving and acquiring more greenspace. The *Growth Policies Plan* has been significantly impacting the way greenspace changes throughout the city. Furthermore, this could encourage a future Growth Policies Plan where the priority is set for preserving and acquiring greenspace.

Conclusion

Greenspace provides many benefits, often referred to as ecosystem services, and generates an opportunity to stimulate everyday life along with our future well-being. The choices we make today in how we use land and water resources will have enormous consequences on the future sustainability of Earth's ecosystems and the services those ecosystems provide (for a list of benefits and their descriptions, see Appendix A).

The Environmental Commission has been measuring the city's overall greenspace. The reports both include and exclude AIFAs, serving to transition the way greenspace is represented in Bloomington. Reviewing the "Bloomington Greenspace Loss" map from the "Greenspace Trends in Bloomington, Indiana 1993-2007" report, the previous information for loss of greenspace from 1993-2007 can be used as a reference for the past.

The new method of recording Bloomington's loss or increase of greenspace without the AIFA will help define actual greenspace within the city because it is not clear if some of the AIFA acres will eventually be in the city limits. The trend from 1993-2011 shows the rate of greenspace loss is declining, and is now breaking even. The goals and recommendations of the city's Climate Action Plan, will most likely add to the city's overall greenspace. With changes in future greenspace reports and acquiring funds for additional property purchase, Bloomington's greenspace will thrive more than ever.

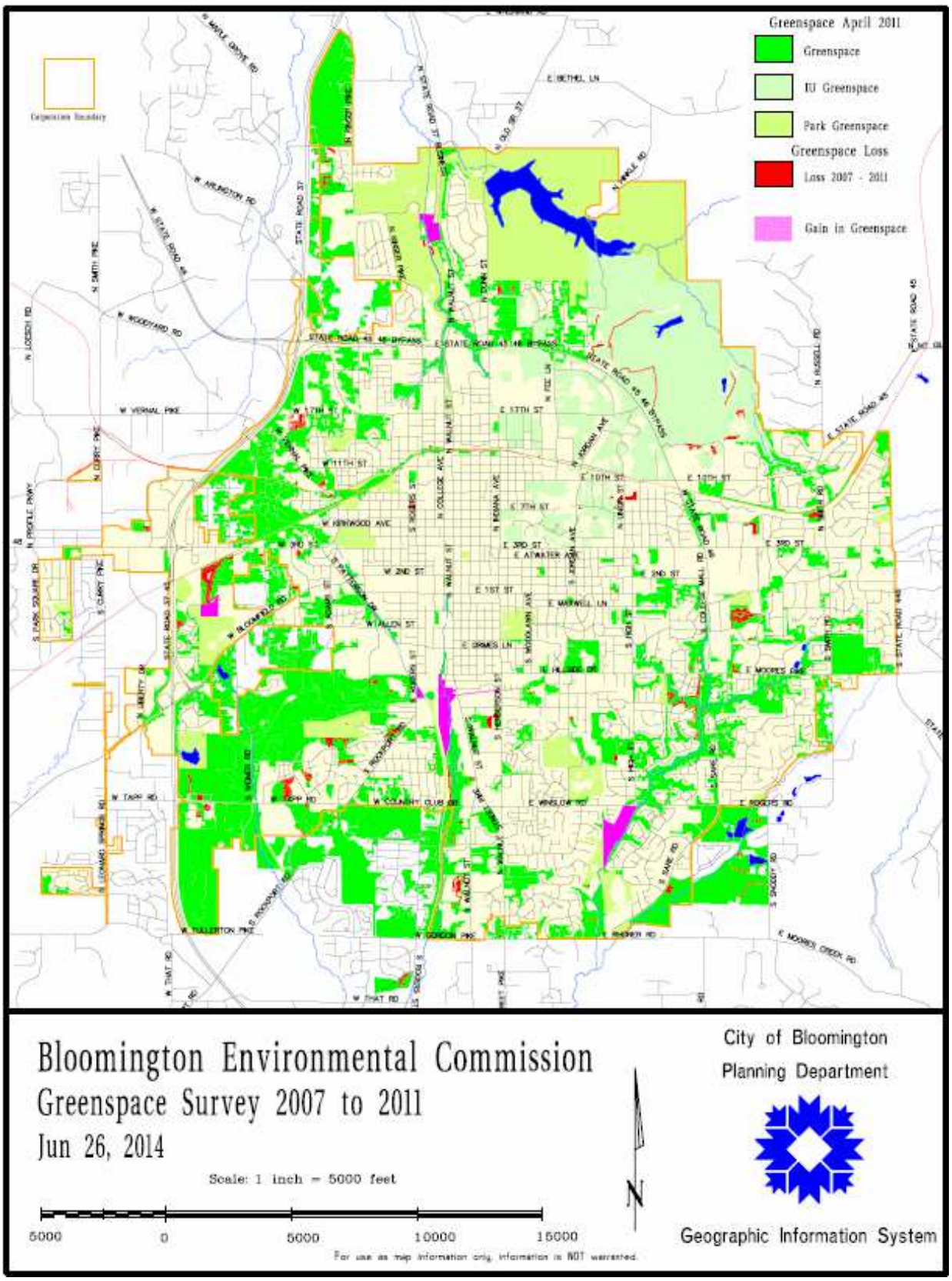


Figure 3. Bloomington Greenspace Change with AIFA.

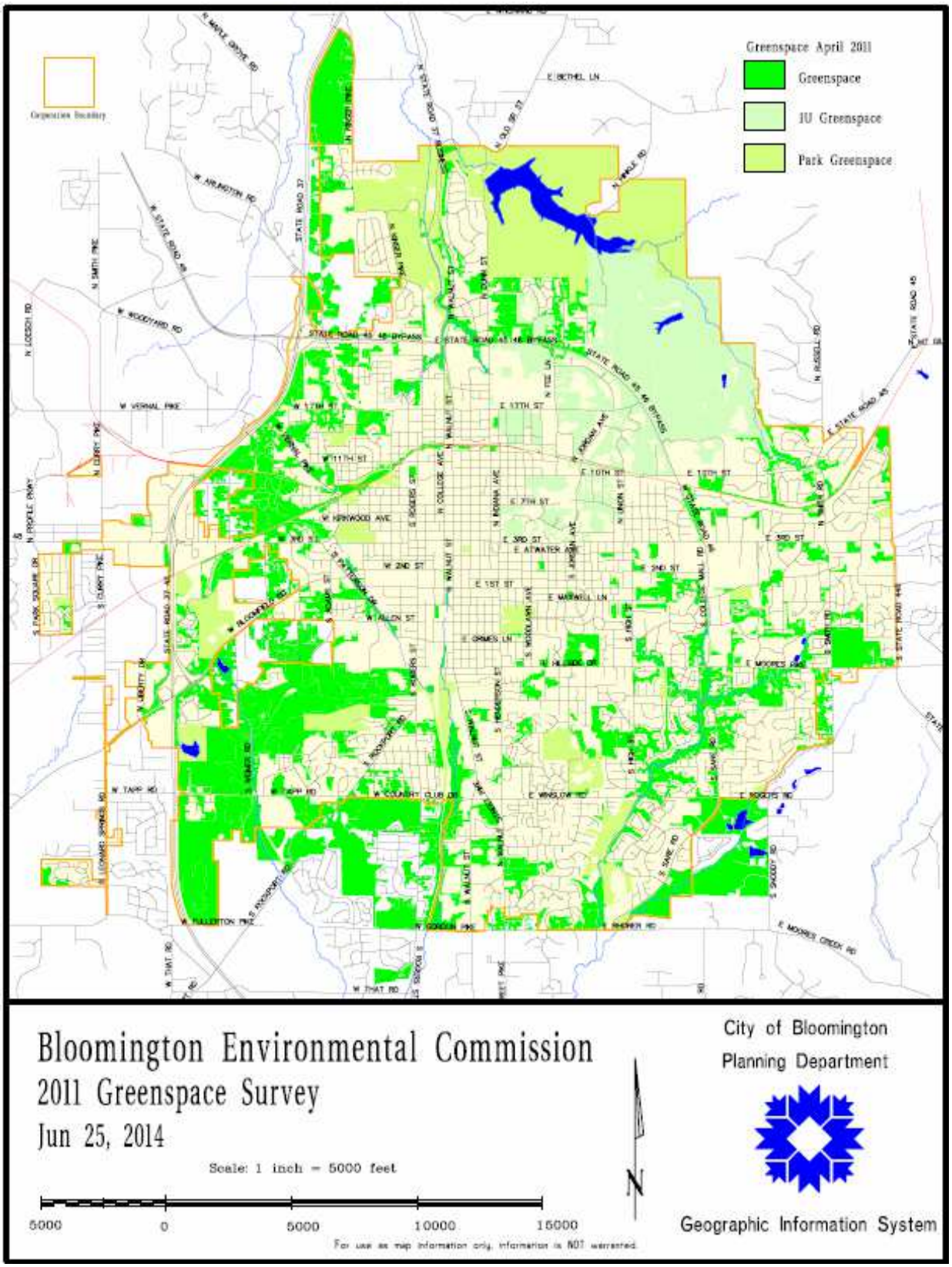


Figure 4. Remaining Bloomington Greenspace with AIFA.

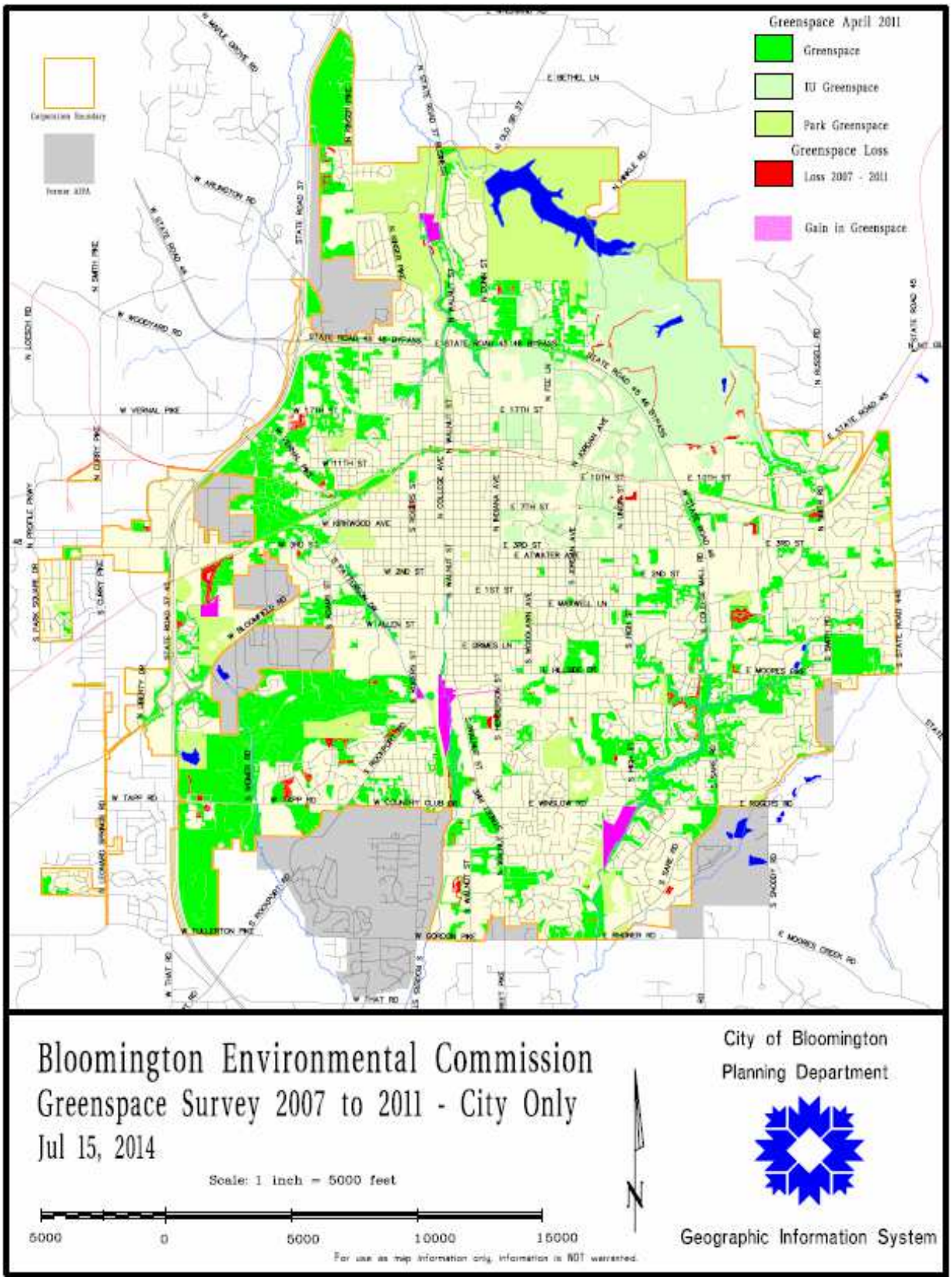


Figure 5. Bloomington Greenspace Change without AIFA.

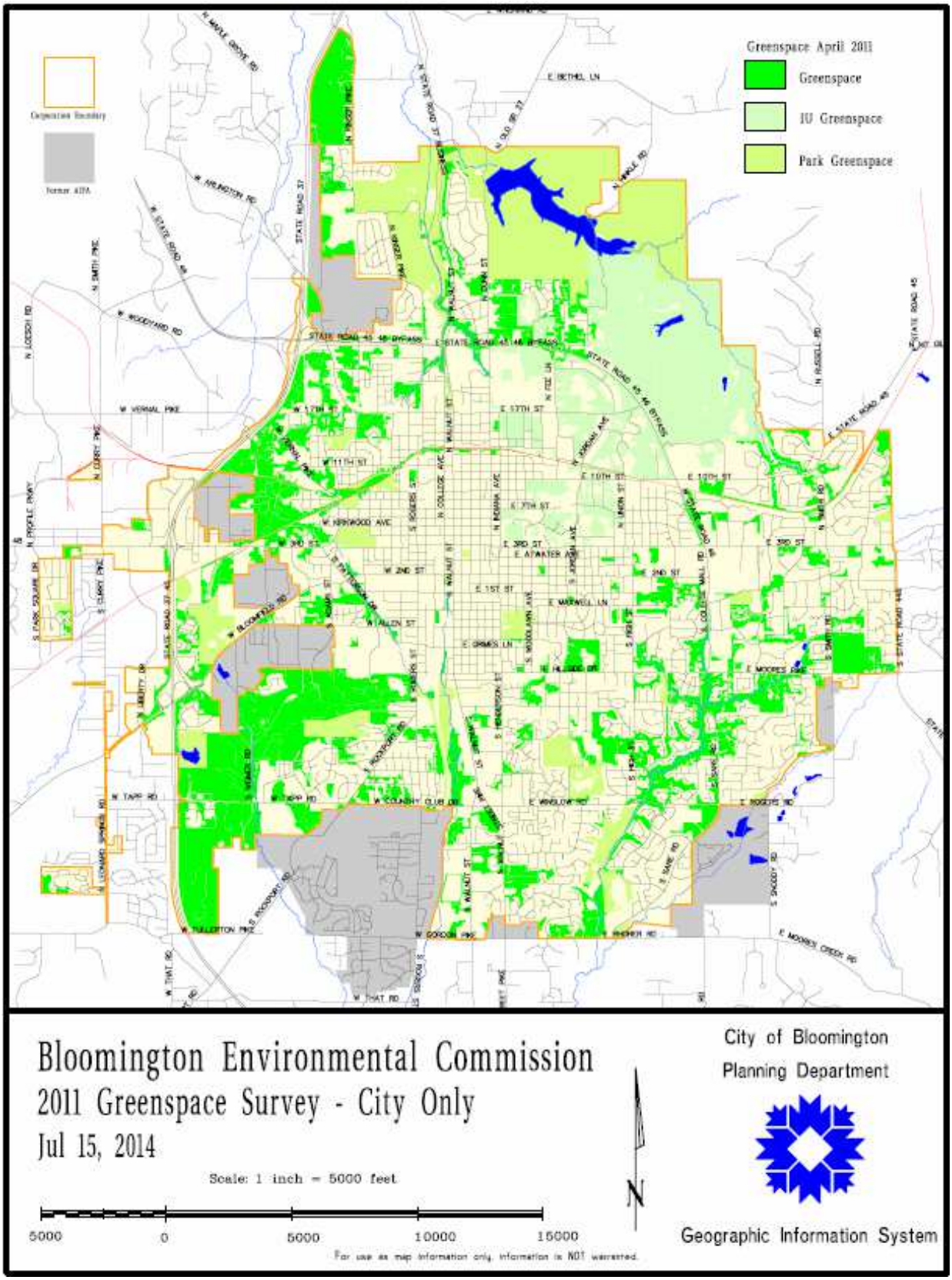


Figure 6. Remaining Bloomington Greenspace without AIFA**.**

APPENDIX A

Greenspace Benefits

Retrieved from the reports "Greenspace Trends in Bloomington, Indiana 1993-2007" and "EPA Model Ordinances Language: Open Space Development Model Ordinance"

Examples of civic, economic, and environmental benefits provided by greenspace include:

- **Improved air quality and carbon sequestration.**
    - Trees, shrubs, and other vegetation produce oxygen, absorb carbon dioxide, and filter particulates. A single tree can remove from 35 to 800 pounds of carbon dioxide from the atmosphere annually.
- **Moderation of climate.**
    - Vegetation has a substantial cooling effect in summer, helping to reduce the higher urban temperatures and associated energy costs for air conditioning. Vegetation also serves as a windbreak, and its insulating effect in the winter helps to reduce heating costs.
    - Reduces potential pressure to encroach on resource buffer areas.
    - Preserves greenspace.
- **Erosion control, water quality protection, and groundwater recharge.**
    - Runoff water from impervious surfaces can erode soil, cause flooding, and carry sediment, hazardous material and chemicals into water supplies. In contrast, vegetated surfaces trap sediment and allow water to percolate into soil, reducing storm water flow and replenishing groundwater.
    - Reduces the impervious cover in a development. Impervious cover contributes to degradation of water resources by increasing the volume of surface runoff, and preventing infiltration into the soil surface.
    - Reduces rainfall pollutant loads to streams and other water resources.
    - Reduces soil erosion potential by reducing the amount of clearing and grading on the site.
    - Reduces the cost of stormwater management by concentrating runoff in one area and reducing runoff volumes.
- **Habitat for wildlife.**
    - Vegetated areas provide food and shelter for animals and microbes that in turn provide additional ecosystem services to humans, such as pollination, pest control, and cycling of wastes and nutrients.

- Creates urban wildlife habitat “islands.”

- **Recreation and promotion of healthier lifestyles for residents.**
  - Greenspace provides opportunities for hiking, camping, and other outdoor activities that improve physical and mental health. Outdoor experiences in nature may be especially important for the physical and emotional well-being of children.
  - Preserves open space for recreation.
  - Creates a sense of community and pedestrian movement.
  - Can support other community planning goals, such as farmland preservation, affordable housing, and architectural diversity.

- **Increased tourism and business.**
  - Greenspace and greenways attract tourists, businesses, and a creative workforce. The development of the “B-Line Trail” has served as an excellent example of this.

- **Improved real estate value.**
  - Studies show a positive relationship between property value and proximity to greenspace.
  - Reduces the capital cost of development.
  - Provides a wider range of feasible sites to locate stormwater best management practices (BMPs).
  - Reduces the cost of future public services needed by the development.
  - Can increase future property values.

- **Prevention of youth crime.**
  - Evidence suggests that parks and recreation programs structured to provide educational and social opportunities help reduce crime.

APPENDIX B

Methodology

In 2014, the City of Bloomington, IN's Environmental Commission (EC) and Planning Department, with the support of the city Information and Technology Services (ITS) and Parks and Recreation Departments, and Indiana University (IU), commenced a report to analyze and assess greenspace loss and/or gain within the City of Bloomington. The EC is an advisory body composed of Bloomington citizens appointed by the Mayor and Common Council. Its mission is to actively participate in the city planning process by researching, reporting, and developing educational outreach activities and materials on environmental topics. This Greenspace Trends Report examines the amount of greenspace owned by three categories: IU Greenspace, Park Greenspace, and Other Greenspace (Non-IU/Non-Park). This report also evaluates the amount of greenspace change from the previous report to the current year.

The first step is to gather aerial photography and use the image as a base map for the report. In 2014, the city, county, and IU are updating their Geographic Information Systems (GIS) with new aerial photography, which is not yet available. Therefore the latest data that could be collected is from 2011.

Using IU's GIS and attaining data from the city's GIS, the process consisted of using layers overlaid on the 2011 aerial image. The overlaid layers consist of: City Boundary, Road Centerlines, Edge of Pavement, Parking Areas, Building Footprints, and total greenspace from 2007. Locating new areas of development, the polygon tool was used to find overlapping layers on the 2007 greenspace. The areas where layers overlapped with the 2007 greenspace were then defined representing 2011 greenspace loss. Further, a ten foot buffer was created around these new areas of greenspace loss following the guidelines defining greenspace. This process was repeated throughout the entire city and used to locate all areas of new greenspace loss.

Once locating greenspace loss was complete, Dave Williams, Operations & Development Director from Parks and Recreation shared information on the amount of greenspace obtained by their department. The information was shared via a Microsoft Excel document showing the parcel name, lot number, description, and whether or not the land was donated or bought. Furthermore, after typing in the parcel number on the county website, each individual parcel was found and replicated as a new layer on the final map showing loss/increase in greenspace.

After compiling the information one can see the areas previously intended to be annexed into the city of Bloomington. These areas were included in past greenspace reports, because it was assumed they would soon be included within the municipal boundaries. While continuing the trend of keeping the AIFA on one map that shows gain or loss for comparison with the past, an additional map was created showing only the city's current jurisdiction and its loss of greenspace without the AIFA. Since then, the AIFA no longer is defined or assumed to be annexed into the city. In this way, separating these maps will provide a clear transition from all greenspace loss to greenspace loss within the defined areas of City of Bloomington. Together, a total of four maps have been produced: Bloomington Greenspace Loss with AIFA, Remaining Greenspace in Bloomington with AIFA, Bloomington Greenspace Loss without AIFA, and Remaining Greenspace in Bloomington without AIFA.

Table 1 was calculated by subtracting the greenspace of the AIFA from the total acreage of greenspace in Bloomington. This represents only the greenspace within the city boundary. This greenspace is further split into the categories IU, Park, Non-IU/Non-Park, and Total greenspace.

Figure 1 was created by using the data from Table 2. A graph was made in Microsoft Excel in order to show the trend in loss/increase of greenspace from 1993-2011.

Table 2 was calculated accumulating previous data from past greenspace trend reports and new 2011 data. To calculate each percentage for loss of greenspace, referring to Table 3, take the total acreage for a specific category (i.e. IU Greenspace) and subtract the year (i.e. 2007) from the year being compared (i.e. 1993). Then divide the amount by the year being compared (i.e. 1993) and multiple the amount by 100%. Repeat this process for every category and year. Or follow this formula: new year – old year / old year X 100%.

Figure 2 was created by using the data from Table 3. Multiple graphs were made in Microsoft Excel in order to show the trends in the four different categories from 1993-2011.

Table 3 was calculated by accumulating previous data from past greenspace trend reports and finding the acreage of the new greenspace loss layer on ArcGIS. Using aerial imagery from 2011, a 2007 greenspace layer was placed on top of the imagery. Using ITS GIS layers, mentioned above, it was determined where new loss of greenspace was located by finding where these layers overlapped. Creating a new layer, the polygon tool was used to fill these overlapping areas and for the entire city. Once finished, the attribute table provided the acreage information compiled together and subtracted out the new layer of greenspace loss.

Figure 3, Bloomington Greenspace Loss with AIFA, shows loss of greenspace in the City of Bloomington and proposed areas for annexation. Loss of greenspace is the focus of this map and is shown in the key by color. The key demonstrates color coordination with the loss of greenspace from the year 2007-2011.

Figure 4, Remaining Bloomington Greenspace with AIFA, shows the remaining greenspace in the City of Bloomington including AIFA. The key demonstrates division between ownership of greenspace between Parks and Recreation, IU, and Non-Park/Non-IU.

Figure 5, Bloomington Greenspace Loss without AIFA, shows greenspace loss in the City of Bloomington only, excluding any information about proposed areas of annexation. The key demonstrates color coordination with the loss of greenspace from the year 2007-2011. The grayed out section represents where the former AIFAs were located.

Figure 6, Remaining Bloomington Greenspace without AIFA, shows the remaining greenspace in the City of Bloomington excluding any information about proposed areas of annexation. The key demonstrates division between ownership of greenspace between Parks and Recreation, IU, and Non-Park/Non-IU. The grayed out section represents where the former AIFAs were located.

References

City of Bloomington, Indiana, Community, About Bloomington, "A Short History of Bloomington & Monroe County" 2008. Available at: https://bloomington.in.gov/documents/viewDocument.php?document_id=3052

City of Bloomington, Indiana, Environmental Commission, Bloomington Environmental Quality Indicators (BEQI), BEQI Green Infrastructure, "Threats to Green Infrastructure" 2008. Available at: https://bloomington.in.gov/documents/viewDocument.php?document_id=3015

City of Bloomington, Indiana, Environmental Commission, "Greenspace Trends in Bloomington, Indiana 1993-2003" 2002. Available at: https://bloomington.in.gov/media/media/application/pdf/48.pdf

City of Bloomington, Indiana, Environmental Commission, "Greenspace Trends in Bloomington, Indiana 1993-2007" 2007. Available at: https://bloomington.in.gov/media/media/application/pdf/2738.pdf

City of Bloomington, Indiana, Environmental Commission, "Towards A Comprehensive Greenspace Plan. For the City of Bloomington 2003" 2003. Available at: http://bloomington.in.gov/media/media/application/pdf/112.pdf

City of Bloomington, Indiana, Planning Department, Long Range Planning, "Growth Policies Plan (GPP)" 2002. Available at: https://bloomington.in.gov/media/media/application/pdf/49.pdf

Ecological Society of America, "Ecosystem Services: A Primer." Summer 2000. Available at: http://www.actionbioscience.org/environmental/esa.html

Oxford Dictionaries, "Definition of Green Space" 2014. Oxford University Press. Available at: http://www.oxforddictionaries.com/us/definition/american_english/green-space

United States Environmental Protection Agency, "Model Ordinances: Open Space Development Model Ordinance" 2012. Available at: http://water.epa.gov/polwaste/nps/mol3.cfm#content

United States Environmental Protection Agency, "Urban Environmental Program in New England" 2014. Available at: http://www.epa.gov/region1/eco/uep/openspace.html